LLNL **Lessons Learned** LLNL

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Handle Undocumented Legacy Systems and Equipment With Care

Some Lawrence Livermore National Lab (LLNL) facilities have been operational for over half a century. Older facilities may have legacy equipment or systems that were contaminated years ago, and the recorded history ("pedigree") or knowledge of the equipment and systems may be incomplete. Without such a pedigree, these systems, equipment, facilities, and labs should be handled as if they could potentially be contaminated.

An LLNL facility recently replaced five roof-mounted exhaust fans as part of a routine facility reinvestment project. The ES&H evaluation process identified the hazards associated with the work and included historical knowledge from the past 2 experimenters, going back approximately 23 years. The exhaust fans and associated hoods were believed to be free of contamination, because they had never been used for radioactive work. However, the knowledge of the *entire system* was incomplete.

The first four exhaust systems to be removed were sampled for contamination with negative results, and no contamination was anticipated in the last system. The resident Health and Safety (H&S) technician instructed the contractors to contact the tech when they were ready to break into the last system, so the tech could take cursory surveys and swipes. However the notification did not occur.

After the last exhaust system was removed, the Radioactive and Hazardous Waste Management (RHWM) technician used a radiation meter to monitored the waste slated for disposal, a routine process for assuring any material going to landfill is not contaminated. The RHWM tech discovered that the exhaust fan and the associated ducting were contaminated with Carbon 14.

Records showed that the hood, blower, and exhaust fan had all been replaced in the 1980s, and no radiation work had been performed in the hood since their installations. However, the ducting running from the hood up to the exhaust fan had been installed decades earlier and may have been the original ducting. There was no documentation of the ducting contamination, nor was the ducting labeled. Investigators concluded that the radioactive contamination came from the ducting.

The ES&H Team, facility staff, and the Plant Engineering Department responded quickly and effectively to contain and identify the extent of the contamination, protect workers and the environment, and inform line management and others per established protocols.

A review team formed by line management concluded that the ES&H evaluation process was less than adequate, because it failed to acquire sufficient information to understand *all* the issues surrounding this type of work. Unexpected contamination had been found in a roof-mounted duct located in a different area of the same building's roof the previous year. That level of contamination was very low (300 dpm) so it was not a reportable occurrence. Unfortunately, the discovery of contamination was not formally documented nor considered when evaluating the safety of this facility reinvestment project. Fortunately, there were no personnel exposures in either of these two events.

What Was Learned

- Effective communication between organizations and individuals regarding roles, responsibilities, analysis, approval, and expectations is extremely critical when dealing with legacy equipment.
- Legacy equipment, systems, and facilities, especially those without a complete documented history, require an ES&H evaluation process that anticipates the presence of contamination hazards.
- Relying on the collective memories of the facility staff, workers, and the ES&H Team can be less than adequate.
- An effective process is needed to document historical information about legacy equipment, systems, and facilities and to see that it is communicated appropriately.

Recommended Actions for LLNL Employees

1. Give careful attention to legacy systems, particularly when the history is not fully characterized. Do not make assumptions. Use extra vigilance and do not rely on process-knowledge when working with or disposing of legacy items.
2. Explore all available resources to evaluate legacy equipment to determine if they may have been used for hazardous or radioactive work. If the complete history is unknown, be very suspicious of possible contamination.
3. Contact your safety team to perform a complete and independent contamination survey before processing legacy equipment or sending parts out of an area.
4. Facility management and safety teams should develop a process through which non-reportable occurrences are communicated more broadly and considered when evaluating the safety of future projects.